APPENDIX F.2

CABLE FAULT MODEL

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CABLE FAULT MODEL

This portion of Appendix F describes a cable fault model that was developed to estimate the likelihood that the cable would be snagged by commercial fishing gear.

F.2.1 Description of the Cable Fault Model

For the purpose of this discussion, a "cable fault" is defined as an event associated with an installed undersea cable system that requires some repair and maintenance activity to ensure continued useful service of the cable system, and/or involves some claim of damage to fishing gear due to hooking the cable. Due to the high cost of typical undersea cable repairs, cable company owners make every effort possible to bury the cable throughout its length. Also, international organizations and cable suppliers/installers maintain very accurate records of cable faults, and the cause of those faults in order to assist in future deployments in particular regions or in geographically similar areas. [1] Such data are used herein to make predictions for the Global West Network.

The cable fault model employs a "cable fault rate" coefficient, expressed in faults per kilometer of cable per year, which is determined from an extensive data base compiled over a period of three decades. The most applicable portion of this data base consists of the records kept for all undersea fiber optic cables deployed over the past 10 years in the Pacific Ocean, in particular, those deployed in the vicinity of the West Coast of the U.S. and Canada.

Faults in fiber optic systems on the West Coast have occurred from two sources: (1) trawling on *exposed* (non-buried) cables in relatively deep water, and (2) manufacturing defects in the cable aggravated by deployment and/or undetected prior to installation. The recent fault history of undersea fiber optic cables on the shelf of the West Coast of the U.S. is summarized in Table F-5. Table F-5 shows that TPC-4 and NPC cables suffered four faults each in the early 1990s. Three of the four NPC faults are believed due to defects discovered during or shortly after deployment, and one fault in 1990 was attributed to a fishing trawler. On the other hand, three of the four TPC-4 faults were attributed to fishing trawlers, all within the same heavily trawled area within the first year after installation. Subsequently, that portion of these cables lying within the heavily trawled area was re-routed away from the high-risk area where burial was not feasible. After this re-routing in 1992, only one cable fault due to fishing trawlers has occurred. The remaining fiber systems have been free of faults. According to the records kept by the NAZ (see footnote 1 below), there have been *no* faults to buried fiber optic cables off the California coast. All fishing-related cable faults in California to date have involved old, *unburied* analog (coax) cable systems.

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[1] The world leaders in undersea cable supply include Tyco Submarine Systems Ltd., Alcatel Submarine Networks, KDD, and Cable & Wireless Marine, all of whom participate in the Submarine Cable Improvement Group (SCIG). In addition, they are all associated with the Association of Cable Maintenance Authorities (ACMA). The North American Zone (NAZ) of the latter group is the applicable authority for the West Coast of the U.S. and Canada. The named cable suppliers above are the *only* suppliers for *all* planned systems in California.

While all of the cables in Table F-5 are generally perpendicular to the coastline, the most important parameter is not the orientation but rather the depth of water in which the cable is placed and the degree of trawl fishing that occurs there. In general, for all cable faults throughout the world, and for California in particular, the number of cable faults caused by external aggression by fishermen is about 50 percent of the total faults that occur.[2] Hence, for prediction of the number of cable faults during a particular period caused by fishing, the predicted total number is divided by 2.

Another pertinent fact, determined from the worldwide database on cable faults, is that the frequency of faults for unburied cable, due to fishing trawlers, is twice as great as that for buried cables.[3] However, it is also clear that unburied cable, placed within a *heavily trawled* region, will suffer faults at a much greater rate. This is supported by the actual experience of the NPC and TPC-4 cables just discussed.

Table F-5. Faults on the Continental Shelf and Slope of the West Coast of the U.S.

Cable System	*Years in Service*	*Number of Faults (fishing+cable defects)*
NPC (Oregon)	8	1+3=4
TPC-4 (Washington)	6	3+1=4
TPC-5 (California)	3	0
HAW-4 (California)	9	0
HAW-5 (California)	5	0
TOTAL	31	4+4=8

Of the faults noted in Table F-5, only one (TPC-4) is known to have occurred after TPC-4 and the NPC were re-routed away from heavily fished areas where the cable could not be buried. There have been no faults from trawling in any of the cables landing on the west coast that were correctly buried. The TPC-5 system had four landings on the coast, the others had only one landing each, resulting in a total of 8 landings. The total length of these cables on the continental shelf is approximately 1,025 km. As there has only been one fault due to fishing activities since the cables were re-routed and correctly buried, taking into account the 29 combined service years (ignoring the first year of service for NPC and TPC-5), the failure rate in faults per year per kilometer is calculated as:

$$R_f = (1 \text{ fault}/29 \text{ years}/1{,}025 \text{ km})$$

$$= 0.00003 \text{ faults/yr/km (buried)}$$

The available marine geological information from the desk-top study and the actual results of the cable route survey for Global West (described in Chapter 2), and taking into account actual

[2] "Ten Years of Operating Light Wave Systems," Ellen Brain, Lawrence Hagadorn, Elin Upperco, AT&T Submarine Systems, *Conference Proceedings, SUB-OPTIC '97*, San Francisco, May 1997 (pg. 203, Figure 10).

[3] "The effectivity of protection of submarine cable in the North Sea Area," T. den Heijer and S. Frelier, ICPC Plenary Meeting, 14-16 Feb 1995, Portugal.

records of cable burial off the San Luis Obispo area,[4] indicates that greater than 93 percent of the total cable length for Global West (from San Francisco to San Diego) will be completely buried; greater than 97 percent in the San Luis Obispo region will be buried. Since this degree of cable burial is greater than that achieved on the average for all systems in the Pacific region, it is possible to employ in the analytical model a cable "non-burial factor" of "1." (The factor "1" is a normalization factor that corresponds to achieving 90 percent burial; hence, for a cable segment with 93 or 95 percent burial, for example, the use of "1" implies using a very conservative number — since the number would in principle be less than 1.)

To account for the fact that a small portion of the cable (less than 7 percent on average) is exposed, a much more aggressive "non-burial factor" has been computed locally for the exposed portions, as compared to the value of "2" determined from international fault data. More aggressive probabilities of faults to exposed cable will be used to increase the computed probability of a fault in the overall system. Employing values that are 2, 3, 4, 5, and up to 10 times greater than the values obtained from actual data, a sensitivity analysis has been conducted. From the sensitivity analysis it appears, apparently due to the relatively short segments of exposed cable and the associated small area upon the seafloor which these exposed segments occupy, that the fault rate for the overall system is not significantly sensitive to multiplying the predicted fault rate, for the localized (exposed) segments, by factors up to 10 times. A "non burial" factor of 8 (i.e. four times more conservative than the measured value) has been used throughout the modeling effort.

As a direct result of the experience of the failures in the NPC and TPC-4 systems shown in Table F-5, subsequent cables on the West Coast have been buried more extensively, and all of the planned systems coming into San Luis Obispo have a goal of 100 percent burial. Further, all of the planned systems are being deployed and buried by the world leaders: namely, Tyco Submarine Systems Ltd., Alcatel Submarine Networks, and KDD. By participation in the Submarine Cable Improvement Group, all of these companies have access to and plan to use the most advanced state-of-the-art submarine cable deployment and burial techniques. Greater attention is now given during the planning phases to ensure that the cable route passes through regions where fishing activity is minimal.

F.2.2 Application of the Cable Fault Model to the Global West Project

Table F-6 summarizes the calculations of cable fault rate, segment by segment, as the cable passes through each respective fish-catch block region along the cable route (see Appendix F, Figure F-1). The probability of a cable fault within a particular fish-catch block is directly proportional to the intensity of trawling activity within the block. A "trawl fish factor," that compares the trawling intensity (pounds caught) in a particular catch block to the average trawling intensity over all catch blocks, is used in the table.

From the summation of the individual segment faults, using a "non-burial factor" that is 8 times greater for exposed cable (that is, 4 times the statistical average for all data available) along the

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4 Information provided by Tyco Submarines Systems Ltd., based upon actual deployment records maintained for HAW-5 and the two TPC-5 cables laid using cable burial techniques in the vicinity of San Luis Obispo.

Table F-6. Calculation of Cable Faults due to Trawling for Global West

Route ID (N to S)	*Fish Catch Block*	*Route Length (km)*	*Bottom Type*	*Non Burial Factor*	*Trawl Fish Factor*	*Cable Fault Probability (fault/km/yr)*	*Faults Due To Fishing (faults/year)*
San Francisco — Monterey Segment							
1	455	16.9		1	0.751431	0.00003	0.00038098
2	464	5.99		1	0.614826	0.00003	0.00011048
3	465	12.95		1	1.546379	0.00003	0.00060077
4	474	14.37		1	3.888804	0.00003	0.00167646
5	474	1.06	Rock	8	3.888804	0.00003	0.00098931
6	473	3.22		1	0.42568	0.00003	4.1121E-05
7	479	21.35		1	0.567856	0.00003	0.00036371
8	503	2.21		1	1.595091	0.00003	0.00010575
9	503	1.4	Rock	8	1.595091	0.00003	0.00053595
10	502	1.4	Rock	8	1.068755	0.00003	0.0003591
11	502	17.47		1	1.068755	0.00003	0.00056013
12	501	1.39	Rock	8	0.011632	0.00003	3.8803E-06
13	510	14.93		1	0.686404	0.00003	0.00030744
14	509	15.62		1	0.578048	0.00003	0.00027087
15	508	12.97		1	2.791158	0.00003	0.00108604
					Segment Faults/year		**0.00739201**
Monterey — Morro Bay Segment							
16	526	10.09		1	3.821267	0.00003	0.0011567
17	526	4.25	Rock	8	3.821267	0.00003	0.00389769
18	527	4.25	Rock	8	0.709815	0.00003	0.00072401
19	527	6.76		1	0.709815	0.00003	0.00014395
20	533	19.4		1	9.446501	0.00003	0.00549786
21	533	1.55		1	9.446501	0.00003	0.00043926
22	540	15.75		1	1.612527	0.00003	0.00076192
23	540	1.02	Rock	8	1.612527	0.00003	0.00039475
24	539	6.63		1	0.391809	0.00003	7.7931E-05
25	539	3.22	Rock	8	0.391809	0.00003	0.00030279
26	549	2.16	Rock	8	0.160688	0.00003	8.33E-05
27	549	1.62		1	0.160688	0.00003	7.8094E-06
28	548	4.02	Rock	8	0.007478	0.00003	7.2143E-06
29	548	16.89		1	0.007478	0.00003	3.7889E-06
30	547	2.92		1	0.79715	0.00003	6.983E-05
31	554	21.89		1	0.026769	0.00003	1.7579E-05
32	554	0.62	Rock	8	0.026769	0.00003	3.9832E-06
33	562	4.98		1	0.268503	0.00003	4.0114E-05
34	561	16.87		1	0.15622	0.00003	7.9063E-05
35	603	8.31		1	0.353118	0.00003	8.8032E-05
36	602	19.58		1	0.170128	0.00003	9.9933E-05
37	608	15.81		1	0.103189	0.00003	4.8943E-05
38	608	0.88	Rock	8	0.103189	0.00003	2.1794E-05
39	607	3.52	Rock	8	0.025545	0.00003	2.1581E-05
40	607	5.72		1	0.025545	0.00003	4.3836E-06
					Segment Faults/year		**0.01399421**

Table F-6. Calculation of Cable Faults due to Trawling for Global West

Route ID (N to S)	*Fish Catch Block*	*Route Length (km)*	*Bottom Type*	*Non Burial Factor*	*Trawl Fish Factor*	*Cable Fault Probability (fault/km/yr)*	*Faults Due To Fishing (faults/year)*
Morro Bay — Santa Barbara Segment							
41	607	12.56		1	0.025545	0.00003	9.6255E-06
42	608	6.31		1	0.103189	0.00003	1.9534E-05
43	616	10.28		1	0.67422	0.00003	0.00020793
44	615	9.7		1	0.772862	0.00003	0.0002249
45	624	19.34		1	1.892139	0.00003	0.00109782
46	633	19.09		1	3.826036	0.00003	0.00219117
47	639	14.53		1	0.854432	0.00003	0.00037245
48	638	4.7		1	0.098187	0.00003	1.3844E-05
49	644	15.14		1	0.406912	0.00003	0.00018482
50	644	4.27	Rock	8	0.406912	0.00003	0.000417
51	659	11.86		1	0.244887	0.00003	8.7131E-05
52	658	13.81		1	0.120972	0.00003	5.0119E-05
53	658	2.24		1	0.120972	0.00003	8.1293E-06
54	657	15.94		1	0	0.00003	0
55	656	15.53		1	0.180799	0.00003	8.4234E-05
56	655	15.37		1	3.277159	0.00003	0.0015111
57	654	15.31		1	0.406974	0.00003	0.00018692
58	653	12.02		1	0.985045	0.00003	0.00035521
59	653	2.61	Rock	8	0.985045	0.00003	0.00061703
					Segment Faults/year		**0.00763897**
Santa Barbara — Manhattan Beach Segment							
60	653	7.62	Seg 4	1	0.985045	0.00003	0.00022518
61	653	0.41		1	0.985045	0.00003	1.2116E-05
62	667	1.59		1	1.544319	0.00003	7.3664E-05
63	666	21.98		1	4.526865	0.00003	0.00298502
64	666	1.26		1	4.526865	0.00003	0.00017112
65	685	2.14		1	0.555365	0.00003	3.5654E-05
66	684	18.09		1	0.417975	0.00003	0.00022683
67	683	7.81		1	0.290759	0.00003	6.8125E-05
68	683	2.47	Rock	8	0.290759	0.00003	0.00017236
69	706	10.91		1	0.037268	0.00003	1.2198E-05
70	706	0.76	Rock	8	0.037268	0.00003	6.7977E-06
71	705	12.19		1	0.095694	0.00003	3.4995E-05
72	705	5.33	Rock	8	0.095694	0.00003	0.00012241
73	704	13.39		1	0	0.00003	0
74	704	2.56	Rock	8	0	0.00003	0
75	703	15.79		1	1.895599	0.00003	0.00089795
76	703	0.75		1	1.895599	0.00003	4.2651E-05
77	702	13.9		1	0	0.00003	0
78	702	4.83	Rock	8	0	0.00003	0
79	701	7.5		1	0.004268	0.00003	9.603E-07
					Segment Faults/year		**0.00508803**

Table F-6. Calculation of Cable Faults due to Trawling for Global West

Route ID (N to S)	*Fish Catch Block*	*Route Length (km)*	*Bottom Type*	*Non Burial Factor*	*Trawl Fish Factor*	*Cable Fault Probability (fault/km/yr)*	*Faults Due To Fishing (faults/year)*
Manhattan Beach — San Diego Segment							
80	701	9.64		1	0.004268	0.00003	1.2343E-06
81	701	0.13	Rock	8	0.004268	0.00003	1.3316E-07
82	721	21.64		1	0.344946	0.00003	0.00022394
83	742	1.94		1	0.305749	0.00003	1.7795E-05
84	741	20.44		1	2.729112	0.00003	0.00167349
85	741	0.35		1	2.729112	0.00003	2.8656E-05
86	740	15.77		1	0.843085	0.00003	0.00039886
87	739	0.92		1	0	0.00003	0
88	739	1.01	Rock	8	0	0.00003	0
89	759	11.73		1	0.349208	0.00003	0.00012289
90	759	1.93	rock	8	0.349208	0.00003	0.00016175
91	758	19.13		1	0.198832	0.00003	0.00011411
92	757	3.8		1	0	0.00003	0
93	803	18.62		1	1.0908	0.00003	0.00060932
94	803	1.2	Rock	8	1.0908	0.00003	0.00031415
95	802	4.8		1	0.167198	0.00003	2.4076E-05
96	823	21.61		1	0.073962	0.00003	4.7949E-05
97	844	9.13		1	0	0.00003	0
98	843	11.3		1	0.082896	0.00003	2.8102E-05
99	843	0.73	Rock	8	0.082896	0.00003	1.4523E-05
100	861	8.07		1	0.099001	0.00003	2.3968E-05
101	861	1.75	Rock	8	0.099001	0.00003	4.158E-05
102	860	5.74		1	0.216439	0.00003	3.7271E-05
103	860	1.25	Rock	8	0.216439	0.00003	6.4932E-05
				Segment Faults/year			**0.00394874**
				Total Faults/year for Route			**0.038062**
				Total Faults in 25 yrs			**0.951549**
					or = 1 fault per		**26.3years**

entire Global West cable route, as shown in Figure 6-1, it can be seen that 0.95 faults are expected during the 25-year design life of the system. This corresponds to *one cable fault due to fishing trawls* within a 26.3-year period.

Cumulative Impacts Calculation

A cumulative impact calculation using the above described model for all present and planned cables in the San Luis Obispo region (based on data shown in section 6.2.4) shows 0.51 faults are expected during the 25-year design life of the Global West system. This corresponds to *1 cable fault due to fishing trawls within a 48.5-year period*, due to all cables within the region.

F.2.3 Application of the Cable Fault Model to Cumulative Impacts in the San Luis Obispo Region

The cable fault model can be applied to predict the potential cumulative impact of all the past, present, and future projects, including Global West, in the San Luis Obispo coastal region. For the purpose of this study, the following nine fish-catch blocks (listed in Table F-7), are used in the analysis: 607, 615, 624, 608, 616, 625, 609, 617, and 626. Use of these fish-catch blocks encompasses (and goes somewhat beyond) the entire region of interest: from the coastal shoreline in the east, to beyond the 12-mile U.S. territorial limit in the west. Since the Global West cable lies entirely within the 12-mile limit, this is the area within which the cumulative impacts are of concern.

By calculating the number of cable faults that are due to interaction with fishing trawlers, the model predicts the degree to which a potential "conflict of use" (of the seafloor) exists between the cables buried into the seabed and the fishing trawlers. From the detailed calculations (Table F-7) it can be seen that based on proper cable burial — greater than 93 percent is assumed —the number of cable faults due to trawlers is very low. The "composite" non-burial factor (1.49) that is used in the table results from combining the non-burial factor for buried cable with that for non-buried cable — where in the latter case an 8 times greater probability of a cable fault has been assumed (i.e. [{1 X 0.93} + {8 X 0.07}] = 1.49). Using the assumption that, on average, 93 percent of all the cables in the region off the coast of San Luis Obispo will be buried, the 8 times greater probability factor is applied only to 7 percent of the cable in the region. The trawl fish factor shown in Table F-8 relates the amount of fishing in a particular block to the average amount of fishing worldwide, and is used to weight the snag probability for that block relative to the worldwide probability of 0.00003 faults/yr/km. The worldwide rate is computed and explained in section F.2.1.

The total length of cable within each respective fish-catch block is shown in Figure F2-1 and summarized in Table F-8 for all past, present, and planned projects in the future that propose to land in the San Luis Obispo region. The corresponding predicted cable faults due to fishing trawlers are shown in Table F-7.

From Table F-7, it can be seen that only 0.0206 cable faults are predicted to occur per year for all past, present, and planned projects in the San Luis Obispo region. This means that, on average, only one fault will occur every 48.5 years. Assuming all of the cable systems will be in place for the next 25 years, and that cable snags occur at 3 times the rate of actual faults, it is expected that 1.5 cable "snags" due to trawlers will occur (to one or the other of the cable systems analyzed in the San Luis Obispo region) over the 25-year life of the Global West cable. The suggestion that the number of snags may be 3 times greater than the number of cable faults, is to account for some unknowns (e.g., cable snags that did not result in the need to repair) that may have been reflected in the data presented — much like a safety factor for the analysis.

Table F-7. Cumulative Cable Faults in Morro Bay Area

Catch Block	*Route Length (km)*	*Bottom Type*	*Composite Non Burial Factor**	*Trawl Fish Factor*	*Cable Fault Probability (fault/km/yr)*	*Faults Due to Fishing (faults/year)*
607	55.9	7% Rock	1.49	0.025545	0.00003	6.3831E-05
615	134.59	7% Rock	1.49	0.772862	0.00003	0.00464967
624	62.32	7% Rock	1.49	1.892139	0.00003	0.00527094
608	115.89	7% Rock	1.49	0.103189	0.00003	0.00053455
616	68.56	7% Rock	1.49	0.67422	0.00003	0.00206624
625	77.02	7% Rock	1.49	1.168085	0.00003	0.00402148
609	104.91	7% Rock	1.49	0.089207	0.00003	0.00041833
617	43.91	7% Rock	1.49	0.67422	0.00003	0.00132334
626	43.37	7% Rock	1.49	1.168085	0.00003	0.0022645
			Total Faults/yr for Morro Bay Area			**0.02061288**
				or = 1 fault per		**48.5 years**

* The "composite" non-burial factor is calculated by taking into account the cable burial factor for buried segments, and a factor that is 8 times greater for the unburied segments, and combining them in proportion to the quantity buried and unburied. In this case, since we assume that all segments in all fish-catch blocks achieve 93 percent burial, only 7 percent of the cable is subjected to the 8 times greater non-burial factor, i.e., 0.93 + (8 X 0.07) = 1.49.

Since the model is based on a substantial quantity of actual data for fiber-optic systems in the Pacific region, the calculations are supported and reasonable. This result is based on, and confirms, the importance of good burial techniques. Assuming the latter occurs — which is highly probable for the San Luis Obispo region — the cumulative social and economic impact on commercial fishing due to buried fiber optic cables would be less than significant (Class III). On the assumption that each snag would result in lost fishing gear, and that a set of gear costs roughly $50,000, the yearly cost impact of all cables in the area would be $50,000/48.5 X 1.5 or $1,546/year. Although the impact from the relatively small number of "events" or "conflicts" expected would not be significant, having an agreement with fishing operators in place, to provide compensation in the low probability event that a cable fault or damage to fishing trawler gear occurs, will further reduce any potential social and economic impacts.

The impacted fishing area due to all the cables in the region has been computed using the route lengths shown in Table F-7 and avoidance widths of 200 feet and 3,000 feet. Using the same average 7 percent unburied length as was used for snag rate calculations, it can be seen from Table F-9 that, within the nine catch blocks used in the analysis, a nominal area of 3 km^2 is precluded from fishing and a maximum area of 45 km^2 could conceivably be precluded. Compared to the total area available for fishing (706.5 km^2), the reduction is nominally 0.1267 percent or 1.9 percent maximum, both of which are considered insignificant. The total dollar value of the fish caught within the nine blocks (computed from NMFS data) is also given in the table; applying the 0.1267 percent value to this amount yields a nominal dollar loss of about

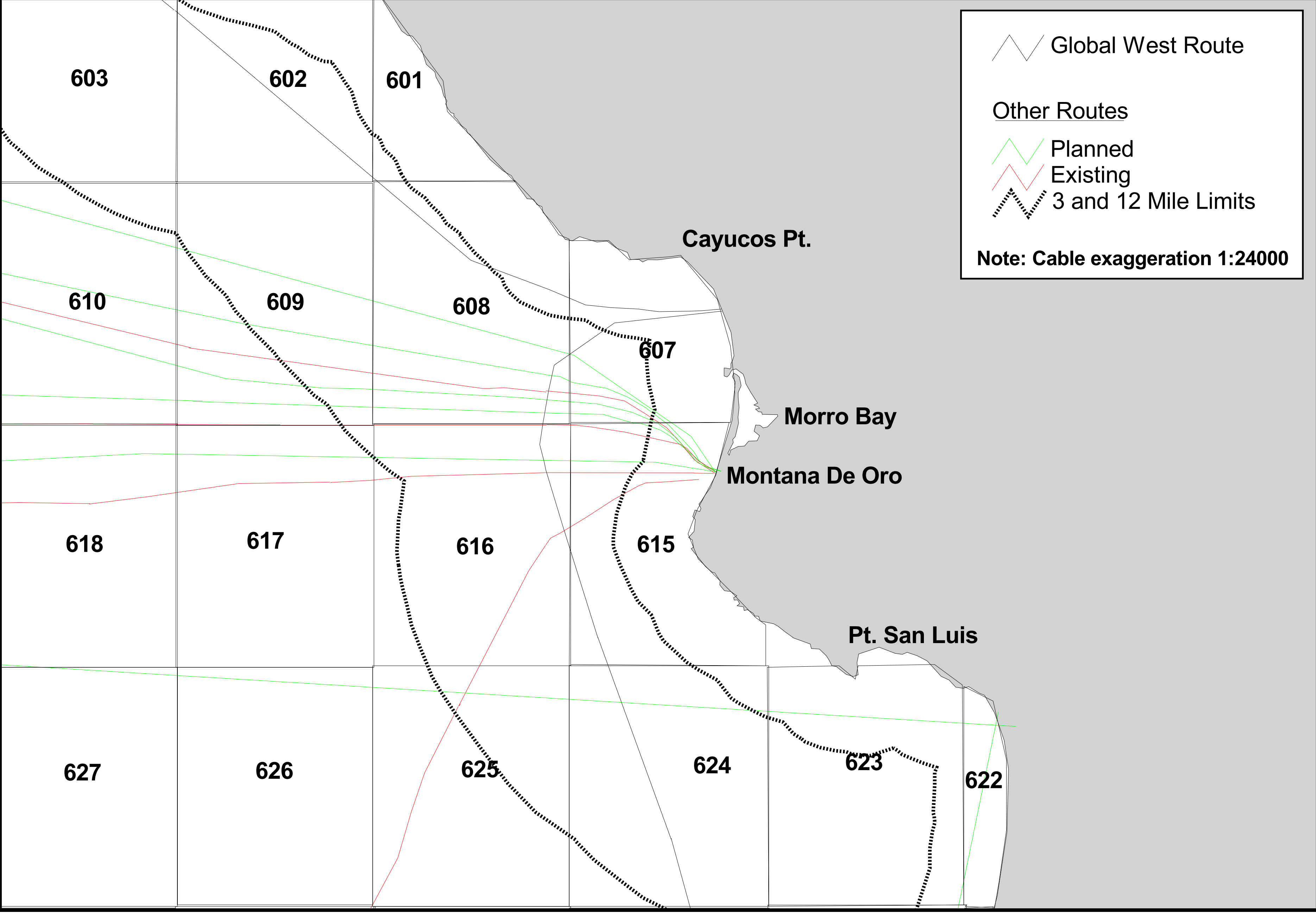

Figure F2-1. Existing and Projected Cable routes within Fish-Catch Blocks Offshore the San Luis Obispo Area

Table F-8. Length of Cable within Fish Catch Blocks in the San Luis Obispo Area, by Cable Project

Fish Catch Block	CABLE SYSTEMS (LENGTH OF CABLE SEGMENT [IN KM] FOR EACH FISH-CATCH BLOCK)													
	Global West-N	*Global West-S*	*UNK (misc.)*	*HAW-5*	*TPC-5 (Hawaii)*	*TPC-5 (north)*	*Southern Cross-N*	*Southern Cross-Hi*	*China-US (north)*	*China-US (China)*	*Japan-US (north)*	*Japan-US (Japan)*	*Pacific Crossing*	*Total Length (km)*
607	11.46	12.20	0.00	0.00	0.00	9.42	11.53	0.00	11.29	0.00	0.00	0.00	0.00	55.90
615	0.00	9.29	14.09	13.88	14.12	8.14	5.07	19.25	6.61	15.25	6.48	22.40	0.00	134.59
624	0.00	19.40	0.00	0.00	0.00	0.00	0.00	23.45	0.00	0.00	0.00	0.00	19.47	62.32
608	16.92	7.26	10.87	0.00	0.00	20.56	19.19	0.00	20.73	0.00	20.36	0.00	0.00	115.89
616	0.00	10.20	8.29	18.60	0.00	15.73	0.00	0.00	0.00	15.73	0.00	0.00	0.00	68.56
625	0.00	0.00	0.00	0.00	24.88	0.00	0.00	0.00	0.00	9.35	0.00	24.10	18.70	77.02
609	2.22	0.00	19.44	2.09	0.00	20.56	19.14	0.00	20.73	0.00	20.73	0.00	0.00	104.91
617	0.00	0.00	20.55	23.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.91
626	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.67	0.00	0.00	18.70	43.37
Total Length	30.60	58.34	73.23	57.94	39.00	74.43	54.94	42.70	59.36	65.01	47.57	46.50	56.86	706.47

$7,735 per year, or $116,025 maximum loss, which is less than funds earmarked for fisheries improvements as part of the Fishers Agreement.

Table F-9. Cumulative Reduction in Morro Bay Fishing from Cable Projects

Fish Catch Block No.	*Total Cable Length (km)*	*Unburied Cable Length (7%)*	*Area Impacted (km²)*	*Total Area in Fish Catch Block*	*% Area Impacted*	*Total Catch Value at Nominal Prices*	*Potential Revenue Loss Nominal*
607	55.9	3.913	0.238693	156.0	0.1531	$533,889	$817.12
615	134.59	9.4213	0.574699	224.0	0.2566	$455,019	$1,167.37
624	62.32	4.3624	0.266106	287.7	0.0925	$386,854	$357.82
608	115.89	8.1123	0.494850	275.4	0.1797	$2,531,572	$4,549.05
616	68.56	4.7992	0.292751	287.7	0.1018	$173,296	$176.34
625	77.02	5.3914	0.328875	287.7	0.1143	$395,168	$451.72
609	104.91	7.3437	0.447966	287.7	0.1557	$59,899	$93.27
617	43.91	3.0737	0.198496	287.7	0.0652	$131,765	$85.87
626	43.37	3.0359	0.185190	287.7	0.0644	$56,708	$36.50
Totals	**706.5**	**49.5**	**3.0**	**2,381.6**	**0.1267**	**$4,724,171**	**$7,735**